[Fuegians.—Grouped from plates in the 'Voyages of the Adventure and the Beagle.']

SOUTHERN ABORIGINES OF SOUTH AMERICA.

Of the most southern aborigines on the globe, inhabiting Patagonia and Tierra del Fuego, we are perhaps best acquainted with the Patagonians, though our knowledge of them is less perfect than might be expected. The name of Tierra del Fuego, given by Magalhaens because many fires were seen in the night upon that land, is applied to all the islands south of Magalhaen's Straits, from 52° 30′ to 56° south latitude, including Staten Land and the islets of Diego Ramirez. The extent of land comprised within these limits probably exceeds the area of Great Britain. This archipelago is a region of clouds, vapours, rain and storms, but the temperature is more uniform than could be expected in so high a latitude. During the summer nights the thermometer frequently sinks to 29°, but even when still lower the cold is not disagreeable, as would be the case in our own climate. Plants which in England require to be delicately nurtured flourish during the winter, and the parrot and the hummingbird may be seen even amid the falling snow. In winter the temperature of the sea is 30° higher than on the adjoining land, and the constant evaporation from the surface of the ocean neutralises the low temperature of the coast. The sides of the mountains are barren towards the sea, but towards the mainland are thickly wooded. Still Tierra del Fuego is one of the most disagreeable countries in the globe.

Captain Fitzroy, who was employed a few years ago in surveying these coasts, divides the Fuegians into six tribes, the whole comprising rather more than three thousand adults. The Yacanas are the most numerous, the number of adults belonging to this tribe being about six hundred. They resemble the Patagonians, and Captain Fitzroy conjectures that they are probably in the same condition in which the Patagonians were before they had horses. The Tekeenicas, who number about five hundred adults, exhibit some of the worst and most melancholy features of savage life. The Alikhoolip tribe, which reckons four hundred adults, are superior to the Tekeenicas, but inferior to the Yacanas. The men, however, are the most robust, and the women the least ill-favoured of any of the Fuegian tribes. The Pecherays, numbering two hundred adults, are the most miserable of these tribes. Captain Fitzroy supposes the Huemul tribe, which only reckons about two hundred adults, to be a branch of the Yacanas. The Chonos tribe consists of about four hundred adults, inhabiting Western Patagonia. The Patagonians are physically and mentally superior to the Fuegians. They have subjugated the horse to their use, and hence are often termed Horse Indians. The tribes to which we shall at present confine our attention are all natives of Tierra del Fuego, with the exception of the Chonos; but as this latter tribe is more nearly allied by its leading customs to the Fuegian tribes, and is like them contradistinguished from the Patagonians by not having subjected the horse, they may be treated in a group, to which the name of Canoe Indians is given. Each of the Fuegian tribes speaks a distinct language, but some words are common to two or more tribes.

Captain Fitzroy, who is perhaps better acquainted with the natives of Tierra del Fuego than any other man, and, as we shall afterwards show, has made greater exertions than any other man to raise them in the scale of civilisation, has sketched their personal appearance and character in his interesting 'Narrative of the Voyages of the Adventure and the Beagle.' We cannot do better than give an extract from his description in his own words:—"The most remarkable traits in the countenance of a Fuegian are his extremely

small low forehead; his prominent brow; small eyes (suffering from smoke); wide cheek bones; wide and open nostrils; large mouth and thick lips. Their eyes are small, sunken, black, and as restless as those of savages in general. Their eyelids are made red and watery by the wood-smoke in their wigwams. The chin varies much; that of a Tekeenica is smaller and less prominent than that of an Alikhoolip, in whom it is large and rather projecting; but there is much variety. The nose is always narrow between the eyes, and, except in a few curious instances, is hollow in profile outline, or almost flat. The mouth is coarsely formed; their teeth are very peculiar; no canine or eye-teeth project beyond the rest, or appear more pointed than those; the front teeth are solid, and often flat-topped, like those of a horse eight years old, and enamelled only at the sides; the interior substance of each tooth is then seen as plainly, in proportion to its size, as in that of a horse. Their hair is black, coarse, and lank. It does not fall off, nor does it turn grey until they are very old. Little if any hair is seen on the eye-brow. They would have a straggling beard, but scrupulously pull out every hair with tweezers made of muscle-shells." Captain Fitzroy observed several men and women whose appearance resembled that of the New Zealanders.

"Their heads are remarkably low, but wide, and full from the ears backward. The neck of a Fuegian is short and strong. His shoulders are square, but high; his chest and body are very large. The trunk is long, compared to the limbs and head. His arms and legs are rounder, and less sinewy than those of Europeans; his joints are smaller, and his extremities are likewise comparatively less. The hands are shaped like those of Europeans, but the feet, from always going barefooted, are square at the toes. Most of them are rather bow-legged, and they turn their feet a little inwards in walking. The knee is strained by the custom of sitting so long on their heels, so that, when straightened, there are considerable folds or wrinkles of loose skin above and below the joint. The muscles of their thighs are large, but those of the legs small.

"A small fillet is all that is worn around the head. Usually this is a mere string, made of the sinews of birds or animals; but to make a show, they sometimes stick feathers, bits of cloth, or any trash given to them, into their head-bands. White feathers, or white down, on the fillet, is a sign of hostility, or of being prepared for war. Red is the favourite colour, denoting peace, or friendly intentions, and much admired as ornamental. Red paint, made with ochre, is profusely used. Their white paint is added to the red when preparing for war; but the marks made are mere daubs, of the rudest, if of any design. Black is the mourning colour. After the death of a friend, or near relation, they blacken themselves with charcoal and oil or grease. Any sort of clay is used, if their paint is scarce, to preserve warmth, rather than as an improvement to their appearance

"When discovered by strangers, the instant impulse of a Fuegian family is to run off into the wood, with their children and such things as they can carry with them. After a short time, if nothing hostile is attempted by the intruders, and if they are not too numerous, the men return cautiously, making friendly signs, waving pieces of skins, rubbing and patting their bellies, and shouting. If all goes on quietly, the women frequently return, bringing with them the children; but they always leave the most valuable skins hidden in the bushes. This hasty concealment of seal or other skins is the result of visits from sealers, who frequently robbed Fuegian families of every skin in their possession.

"Scarcity of food, and the facility with which they move from one place to another in their canoes, are no doubt the reasons why the Fuegians are always so dispersed among the islands in small family parties, and why they never remain long in one place, and why a large party are not seen many days in society. They never attempt to make use of the soil by any kind of culture; seals, birds, and particularly shell-fish being their principal subsistence: any one place therefore soon ceases to supply the wants of even one family; hence they are always migratory.

"In a few places, where the meeting of tides causes a constant supply of fish, especially porpoises, and where the land is broken into multitudes of irregular islets and rocks, whose shores afford an almost inexhaustible quantity of shell-fish, a few families may be found at one time, numbering altogether among them from twenty to forty souls; but even these approaches towards association are rare, and those very families are so migratory by nature, that they do not remain many months in such a spot, however productive it may be, but go wandering away among the numerous secluded inlets or sounds of their country, or repair to the outer sea-coast in search of seals, a dead whale, or fragments of some wrecked ship. During the summer they prefer the coast, as they then obtain a great quantity of eggs and young birds, besides seal, which come ashore to breed at that season; and in the winter they retire more into the interior waters in search of shell-fish, and the small but numerous and excellent fish which they catch among the sea-weed (kelp)."

Mr. Darwin, the naturalist, who accompanied the surveying ships, after visiting a party of the Fuegians, says:—"The party altogether closely resembled the devils which come upon the stage in such plays as Der Freischutz..... Their very attitudes were abject, and the expression of their countenances distrustful, surprised, and startled."

Of the mental character, arts of life, and the manners and customs of the Fuegians, we purpose to give some account in a future number.

DOMESTIC ECONOMY.

BOILING FOOD.

COUNT RUMFORD,* a most able American writer on the philosophy of preparing food for the use of man, says, that all the fuel which is used for making water boil violently in dressing of food is absolutely wasted; and in another place he says, that the waste of fuel in culinary processes, which arises from making liquids boil unnecessarily, or where nothing more would be necessary than to keep them boiling hot, is enormous." "There is not a doubt," he adds, "that much more than half the fuel used in all the kitchens, public and private, in the whole world, is wasted precisely in this manner." But the mere waste of fuel is not the only evil attendant upon violently boiling; the meat itself is rendered tough, and otherwise materially injured.

It is well known that meat may be dressed in water, which is kept boiling hot, without actually boiling, and also that it may even be cooked with a degree of heat below the boiling point.

The heat of boiling water is not the same in all situations; that it depends on the pressure of the atmosphere, and consequently is considerably greater at the level of the surface of the sea than in inland countries, and on the tops of high mountains; but we never heard that any difficulty was found to attend the process of dressing food by boiling, even in the highest si-

* Count Rumford was born in New England in 1752; his name was Benjamin Thompson, and he was created a count by the king of Bavaria, in whose service he lived many years.

tuations. Water boils at London (and at all other places on the same level) at the temperature of 212° of Fahrenheit's thermometer; but it would be absolutely impossible to communicate that degree of heat to water in an open boiler in Bavaria. The boiling point at Munich, under the mean pressure of the atmosphere at that place, is about 209½° of Fahrenheit's thermometer; yet nobody ever perceived that boiled meat was less thoroughly done in Munich than in London. But if meat may, without the least difficulty, be cooked with the heat of 209½° of Fahrenheit at Munich, why should it not be possible to cook it with the same degree of heat in London? If this can be done (which can hardly admit of a doubt), then it is evident that the process of cookery, which is called boiling, may be performed in water which is not boiling hot.

It is well known, from experience, how difficult it is to persuade cooks of this truth, but it is so important that no pains should be spared in endeavouring to remove their prejudices, and to enlighten their understandings. This may be done most effectually in the case before us, by a method which has been several times put in practice with complete success. It is as follows:—Take two equal boilers, containing equal quantities of boiling hot water, and put into them two equal pieces of meat, taken from the same carcass—two legs of mutton, for instance, and boil them during the same time; under one of the boilers make a small fire, just barely sufficient to keep the water boiling hot, or rather just beginning to boil; under the other make as strong a fire as possible, and keep it boiling the whole time with the utmost violence.

The meat in the boiler in which the water has been kept only just boiling hot, will be found to be quite as well done as that in the other, under which so much fuel has been wasted in making the water boil violently to no useful purpose.

It will even be found to be much better cooked; that is to say, tenderer, more juicy, and much higher flavoured; to which may be added, that it will be easier of digestion, a most important consideration as regards the health of human beings. But this subject suggests another connected with it, and, as we think, of even greater importance.

It is well known that in this country the inhabitants suffer more from indigestion, and those diseases arising out of it, than they do in France and Italy, where the food is better prepared, and rendered more digestible, and consequently more wholesome. But does not indigestion cause our people to have recourse to spirituous liquors? We know that in cases of indigestion these spirits, by stimulating the stomach, will for a time afford relief, though in the end they will increase the disease. Nor is this all or the worst consequences attendant upon taking spirits for indigestion; it induces a habit of spirit-drinking, and this once established, the unhappy victim must (perhaps slowly, but certainly surely) sink into perdition. In this view of the case, good cookery is of first-rate importance.

We shall now turn to Count Rumford's experiments and remarks with regard to the saving of fuel, which is a very great consideration as regards the economy of a family, and is not without interest with respect to the welfare of a nation at large, for we know of no country where fuel is not considered an essential requisite in all civilized societies.

The count, in order to ascertain how much fuel is required to dress a given quantity of meat, takes one hundred pounds of beef, and calculates that three pounds of water are necessary to each pound of beef; and that both the water and the beef are at the temperature of 55° of Fahrenheit's thermometer (the mean temperature of the atmosphere in England) at the beginning of the experiment.

The first thing to be ascertained is, how much fuel would be required to heat the water and the beef boiling hot; and then to see how much more would be required to keep them boiling hot three hours.

And, first, for heating the water. It has been shown by experiments that 20$\frac{1}{10}$lbs. of water may be heated 180° of Fahrenheit thermometer, with the heat generated in the combustion of 1 lb. of dry pine wood.

But it is required to heat the water in question only 157°; for its temperature being that of 55°, and the boiling point 212°, it is 212°−55°=157°: and if 1 lb. of the fuel be sufficient for heating 20$\frac{1}{10}$ lbs. of water 180°, it must be sufficient for heating 23 lbs. of water 157°; for 157° is to 180° as 20$\frac{1}{10}$ lbs. to 23 lbs.

But if 23 lbs. of water, at the temperature of 55°, require 1 lb. of dry pine wood as fuel, to make it boil, then 300 lbs. of water (the quantity required in the process in question) would require 12$\frac{6}{10}$ lbs. of the wood to heat it boiling hot.

To this quantity of fuel must be added that which would be required to heat the meat (100 lbs. weight) boiling hot. Now, it has been found by actual experiment, by Dr. Crawford, that the flesh of an ox requires less heat to heat it than water, in the proportion of 74 to 100; consequently the quantity of beef in question (100 lbs.) might be made boiling hot with precisely the same quantity of fuel as would be required to heat 74 lbs. of water at the same temperature to the boiling point. And this quantity in the case in question, would amount to 3$\frac{1}{4}$ lbs., as will be found on making the computation.

This quantity (3$\frac{1}{4}$ lbs.), added to that before found, which would be required to heat the water alone (=23 lbs.), gives 26$\frac{1}{4}$ lbs. of dry pine wood for the quantity required to heat 300 lbs. of water and 100 lbs. of beef (both at the temperature of 55°) boiling hot.

To estimate the quantity of fuel which would be necessary to keep this water and beef boiling hot three hours, we may have recourse to the results of experiments, by which it has been proved that 508lbs. of boiling hot water were actually kept boiling (not merely kept boiling hot), three hours with the heat generated in the combustion of four pounds and a half of dry pine-wood, this gives 338$\frac{2}{3}$lbs. of boiling hot water kept boiling one hour, with one pound of the fuel; and computing from these data, and supposing farther, that a pound of beef requires as much heat to keep it boiling hot any given time as a pound of water, it appear that 3$\frac{1}{3}$lbs. of pine-wood used as fuel, would be sufficient to keep 300lbs. of water, with the 100lbs. of beef in it, boiling three hours. This quantity of fuel (= 3$\frac{1}{3}$lbs.) added to that required to heat the water and the meat boiling hot (= 26$\frac{1}{4}$lbs.), gives 29$\frac{7}{12}$lbs. of pine-wood, for the quantity of fuel required to cook 100 lbs. of boiled beef.

This quantity of fuel, which is just about equal in effect to 16lbs. or three-fourths of a peck of pit-coal, will doubtless be thought a small allowance for boiling 160lbs. of beef; but it is in fact much more than would be necessary merely for that purpose, could all the heat generated in the combustion of the fuel be applied immediately to the cooking of the meat, and to that purpose alone. Much the greatest part of that which is generated is expended in heating the water in which the meat is boiled, and as it remains in the water after the process is ended, it must be considered as lost.

This loss may, however, be prevented in a great measure; and when that is done, the expense in fuel in boiling meat will be reduced almost to nothing. We have just seen that 100lbs. of meat, at the mean temperature of the atmosphere in England (55°), may be made boiling hot with the heat generated in the combustion of 3$\frac{1}{3}$lbs. of pine-wood, and there is no doubt,

with the use of proper means for confining the heat, that this meat might be kept boiling hot three hours, and consequently thoroughly done, with the addition of ¾lb. of the fuel, making in all 4lbs. of pine-wood, equal in effect to about 2¼lbs. of pit-coal; which, according to this estimate, is all the fuel that would be absolutely necessary for cooking 100lbs. of beef.

This quantity of fuel would cost in London less than one farthing and a half, when the ton of coals is sold at about thirty shillings. This, however, is the extreme or utmost limit of the economy of fuel, beyond which it is absolutely impossible to go. It is even impossible, in practice, to arrive at this limit, for the containing vessel must be heated, and kept hot, as well as the meat; but very considerable advances may be made towards it as will be shown hereafter.

If we suppose the meat to be boiled in the usual manner, and that 300lbs. of cold water are heated expressly for that purpose, in that case the fuel required, amounting to 16lbs. of coal, would cost in London (the ton reckoned as above), just 2 pence, or 1¾ farthings. But all this expense ought not to be placed to the account of the cooking of the meat; by adding a few pounds of barley-meal, some greens, roots, and seasoning to the water, it may be changed into a good and wholesome soup, at the same time that the meat is boiled, and the expense for fuel (2 pence, 1¾ farthings) may be divided between the meat boiled (100lbs.; and 300lbs. or 37½ gallons of soup.

The principal design in publishing these computations is to awaken the curiosity of the reader, and fix his attention on a subject, which however low and vulgar it has hitherto generally been thought to be, is, in fact, highly interesting, and deserving of the most serious consideration. We wish therefore they may serve to inspire cooks with a just idea of the importance of their art, and of the intimate connection there is between the various processes in which they are daily concerned, and many of the most beautiful discoveries that have been made by experimental philosophers in the present age.

The advantage that would result from an application of the late brilliant discoveries in philosophical chemistry, and other branches of natural philosophy and mechanics, to the improvement of the art of cookery, are so evident, and so very important, that it is hoped we shall soon see some enlightened and liberal minded person of the profession take up the matter in earnest, and give it a thoroughly scientific investigation.

In what art or science could improvements be made that would more powerfully contribute to increase the comforts and enjoyments of mankind?

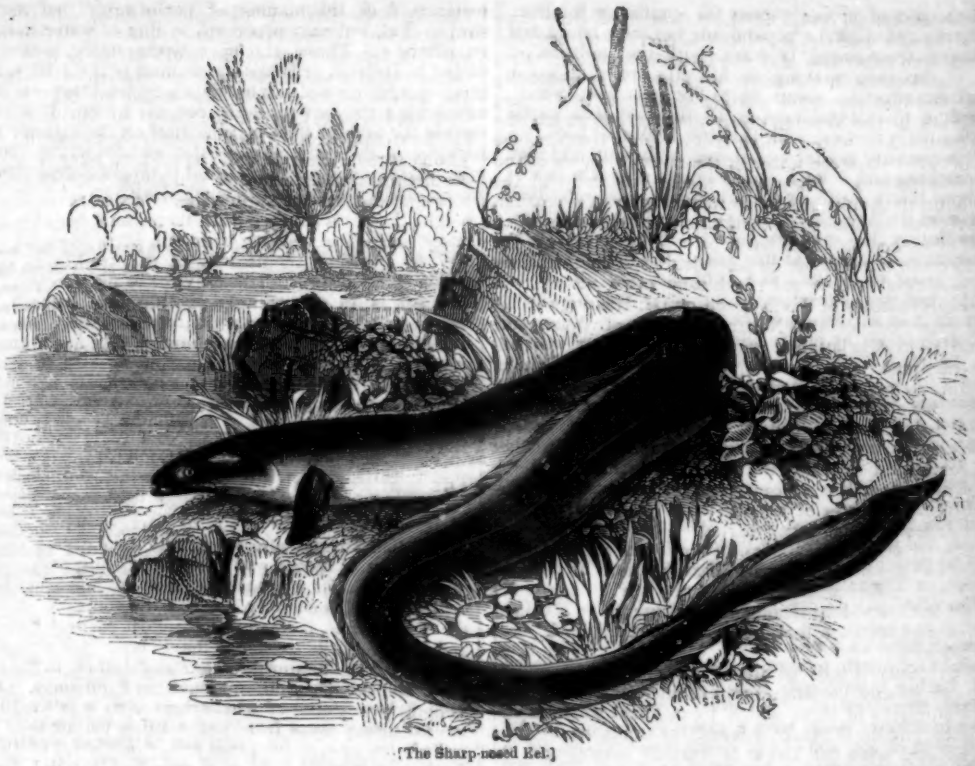
And it must not be imagined that the saving of fuel is the only or even the most important advantage that would result from these inquiries: others, of still greater magnitude, respecting the manner of preparing food for the table, would probably be derived from them.

The heat of boiling water, continued for a shorter or a longer time, having been found by experience to be sufficient for cooking all those kinds of animal and vegetable substances that are commonly used as food; and that degree of heat being easily procured, and easily kept up, in all places and in all seasons, and as all the utensils used in cooking are contrived for that kind of heat, few experiments have been made to determine the effects of using other degrees of heat and other mediums for conveying it to the substances to be acted upon in culinary processes. The effects of different degrees of heat in the same body are however sometimes very striking, and the taste of the same kind of food is often so much altered by a trifling difference in the manner of cooking it, that it would no longer be taken for the same thing. What a surprising difference, for instance, does the manner of performing that most simple of all culinary processes, boiling of water, make on potatoes:—Those who have never tasted potatoes boiled in Ireland, or cooked according to the Irish method, can have no idea what delicious food these roots afford when they are properly prepared. But it is not merely the taste of food that depends on the manner of cooking it, its nutritiousness also, and its wholesomeness, qualities still more essential if possible than taste, are no doubt very nearly connected with it.

Tenacity of Life in Tench.—A piece of water which had been ordered to be filled up, and into which wood and rubbish had been thrown for years, was directed to be cleared out. Persons were accordingly employed; and, almost choked up by weeds and mud, so little water remained that no person expected to see any fish except a few eels, yet nearly two hundred brace of tench of all sizes, and as many perch, were found. After the pond was thought to be quite free, under some roots there seemed to be an animal which was conjectured to be an otter: the place was surrounded, and on opening an entrance among the roots, a tench was found of most singular form, having literally assumed the shape of the hole, in which he had of course for many years been confined. His length from eye to fork was thirty-three inches; his circumference, almost to the tail, was twenty-seven inches; his weight eleven pounds nine ounces and a quarter; the colour was also singular, his belly being that of a char, or vermillion. This extraordinary fish, after having been inspected by many gentlemen, was carefully put into a pond; and at the time the account was written, twelve months afterwards, was alive and well.—*Yarrell's History of British Fishes.*

The Olive-Tree and its Effects on Social Economy.—The inhabitants of the gloomy little towns in the Papal States, their squalid, nothing-to-do appearance as they saunter in listless idleness about their doors, a prey to ague and ennui, are sadly in contrast to their bright sunny land and its glorious vegetation. Their country produces every thing but industry—every thing but industry; and man flourishes as a moral intelligent being only where industry is forced upon him—and civilization and well-being with industry—by natural circumstances—by the want, not the abundance of natural products. Truly the plenty of their country is their curse. Suppose every kail-yard in Scotland had a tree growing at the dyke-side, like the old pollard saughs we usually see there, and requiring as little care or cultivation, and that from this tree the family gathered its butter, suet, tallow, or an oil that answered perfectly all the household uses of these substances, either as a nutritious adjunct to daily food in their cookery, or for soap, or for giving light to their dwellings—all, in short, that our grass-lands and dairies, our Russian trade, our Greenland fisheries, produce to us for household uses—would it be no blessing to have such trees? Such trees are the gift of nature to the people here in the south, and are bestowed with no niggard hand. The olive-tree flourishes on the poorest, scarpy soil, on gravelly, rocky land that would not keep a sheep on ten acres of it, and a single olive-tree will sometimes yield from a single crop nearly fifty gallons of oil. Is this a curse, and not a blessing? Look at the people of all olive-growing countries—and the question is answered. The countries which produce industry, are in a more civilized and moral condition than the countries which produce the objects of industry. No government can give excitement to industry in commerce, agriculture, or manufactures, when soil and climate produce, without any great or continuous exertion of man, almost all that industry labours for.—*Mr. Laing's Notes of a Traveller on the Social and Political State of France, Prussia, Switzerland, Italy, and other parts of Europe.*

Industry.—There is no art or science that is too difficult for industry to attain to; it is the gift of tongues, and makes a man understood and valued in all countries and by all nations; it is the philosopher's stone, that turns all metals, and even stones, into gold, and suffers not want to break into its dwelling; it is the north-west passage, that brings the merchant's ship as soon to him as he can desire. In a word, it conquers all enemies, and makes fortune itself pay contribution.—*Clarendon.*



[The Sharp-nosed Eel.]

THE EEL.

There are three different species of the fresh-water eel (Muræniдæ) abounding in this country—the sharp-nosed (*Anguilla acutirostris*), the broad-nosed (*Anguilla latirostris*), and the snig (*Anguilla mediorostris*). A fourth has been found in some countries; but so very rarely in England, that it is not even mentioned by many naturalists. There is so much similarity between these species, that they were confounded together until within the last few years. The existence of four was first spoken of in the second edition of the 'Règne Animal,' in 1829. Mr. Yarrell, in his interesting work 'On British Fishes,' gives the following description of the appearance of the sharp-nosed eel:—"The head is compressed, the top convex, depressed as it slopes forward; the eyes small, placed immediately over the angles of the mouth; irides reddish-yellow; the jaws very narrow, slightly rounded at the end; the lower jaw the largest: nostrils with two openings on each side, one tubular, the other a simple orifice; both jaws furnished with a narrow band of small teeth; gape small; various mucous pores about the mouth and other parts of the head; gill-opening a small aperture immediately before and rather below the origin of the pectoral fin; the scales on the body rather small; dorsal fin extending over more than two-thirds of the whole length; both united at the end, forming a tail; the number of rays in the fins not easily ascertained, from the thickness of the skin; the lateral line exhibits a long series of mucous orifices; vertebræ 113." The differences between the three species are very slight, being principally in the form of the vertebræ. The snig partakes of the appearances of both the broad-nosed and sharp-nosed. The fresh-water eel is in general about twenty or twenty-two inches in length; they grow very slowly, being seldom more than twelve inches long the first year. The sharp-nosed species attains the greatest size of the fresh-water kind; but the marine species are often five or six feet in length, and some have occasionally been caught above ten feet long. Much prejudice has existed in some countries, and does even to this day, against the eel, on account of the resemblance in its form to the serpent; but Mr. Yarrell says:—"There is but little similarity in the snake and the eel, except in the external form of the body: the internal organs of the two animals, and the character of the skeleton, are most decidedly different." The eel is very much esteemed for food, and vast quantities are consumed in most countries. The Neapolitans have a custom of eating them at Christmas, and in fact they consider them as necessary as the Englishman does his roast beef and plum-pudding. Mr. Yarrell informs us that eels are not only numerous, but are also in great request in many other countries. Ellis, in his 'Polynesian Researches,' vol. ii., p. 286, says:—"In Otaheite eels are great favourites, and are tamed and fed until they attain an enormous size. These pets are kept in large holes, two or three feet deep, partially filled with water. On the sides of these pits they generally remained, excepting when called by the person who fed them. I have been several times with the young chief, when he has sat down by the side of the hole, and, by giving a shrill sort of whistle, has brought out an enormous eel, which has moved about the surface of the water, and eaten with confidence out of its master's hand." Eels are caught in the Thames in wicker baskets, which are attached to a framework of wood and placed in the river. The basket is so constructed that the fish cannot possibly escape when once within the mouth of the basket. Although many are caught

in this manner, London is chiefly supplied from Holland; and a considerable trade is carried on between the Dutch fishermen and the London markets. Eels are not known in the arctic regions: it is generally believed that they have a great dislike to cold: they migrate in the autumn down the rivers to reach the warm brackish water, which is of a higher temperature than either the fresh water of the river or the unmixed salt of the sea. They bury themselves deep in the mud on the banks of rivers during the severe weather, and great numbers are then taken by eel-spears when the tide recedes. Eels have been known to quit the water and travel some distance during the night, either in search of food or to reach some other stream. A curious instance of this is given by Dr. Hastings, in his 'Illustrations of the Natural History of Worcestershire:'—"A relative of the late Mr. Perrott was out in his park with his keeper near a large piece of water, on a very beautiful evening, when the keeper drew his attention to a fine eel quietly ascending the bank of the pool, and with an undulating motion making its way through the long grass; on further observation he perceived a considerable number of eels quietly proceeding to a range of stews, nearly the distance of a quarter of a mile from the large piece of water from whence they started. The stews were supplied by a rapid brook, and in all probability the instinct of the fish led them in that direction as a means of finding their way to some large river, from whence their ultimate destination, the sea, might be obtained. This circumstance took place at Sandford Park, near Enstone."

Mr. Yarrell tells us that "the eel is a voracious feeder during certain months of the year. In winter the stomachs of those which I examined were empty; by the middle of March I found the stomachs of others distended with the larvæ of various insects and the bones of small fishes. They are known to consume a large quantity of spawn, and will attack large carp, seizing them by the fins, though without the power of doing them further injury. Occasionally they eat vegetable substances, and have been seen swimming about the surface of water, cropping the leaves of small aquatic plants. By means of a long and capacious air-bladder, eels rise to various elevations in the water with great ease, and sometimes swim very high even in deep water. When whitebait fishing in the Thames, I once caught an eel in the net in twenty-six feet depth of water, though the whitebait net does not dip more than about three feet below the surface." The eel is capable of enduring very extreme cold; after having been frozen for three or four days, they have been known to recover by being put into water and thus gradually thawed.

It is supposed that after having migrated down the river, the eel deposits its spawn early in the spring, and that the parent fish seldom returns up the river; but says Mr. Yarrell, "the great bulk of their young, however, certainly ascend the stream of the river, and their annual appearance in certain places is looked for with some interest. The passage of young eels up the Thames at Kingston in the year 1832, commenced on the 30th of April, and lasted till the 4th of May; but I believe I am correct in stating that few young eels were observed to pass up the Thames either in the year 1834 or 1835. Some notion may be formed of the quantity of young eels, each about three inches long, that pass up the Thames in the spring, and in other rivers the beginning of summer, from the circumstance that it was calculated by two observers of the progress of the young eels at Kingston in 1832, that from sixteen to eighteen hundred passed a given point in the space of one minute of time. This passage of young eels is called eel-*fare* on the banks of the Thames,—the Saxon word signifying to go, to pass, to travel; and I have very little doubt that the term *elver*, in common use on the banks of the Severn for a young eel, is a modification or corruption of eel-fare." The author of the article *Muræenidæ* in the 'Penny Cyclopædia,' speaking of the ascent of the young fry up the stream, says: "Such a desire do the young eels (about three inches length) appear to have to go up the stream, that their course is not easily stopped. The writer of this has seen a flood-gate, six or seven feet in height, in parts covered with them, and has observed many succeed in passing over this perpendicular barrier by availing themselves of the trickling water which escaped through the crevices of the wood-work." The eel is an exceedingly prolific fish, remarkably tenacious of life, and very easily preserved. Besides inhabiting the rivers of this country, they are found in most ponds and lakes. The marine species, of which the conger is the largest and commonest, are more numerous than the fresh-water.

TRIAL BY ORDEAL.

THE trial by ordeal forms an interesting subject for consideration, in consequence of its having entered so largely into the systems of jurisprudence of our Saxon and Norman ancestors, and thus giving rise to some forms of speech and customs existing even to the present day. Its employment has not, however, been confined to this country, for, on the contrary, during the middle ages, it was in use in most parts of Europe, and traces of its existence have been discovered in countries very dissimilar from each other in point of geographical position, manners, and customs. This general prevalence of what seems to us now so absurd an institution arose from the leading principle of the ordeal (as one of its synonyms, "judgment of God," denotes) depending upon a supposed special divine interposition being induced by its operation. In the transition and imperfect state of society in the ages and countries to which we are alluding, the substantiation of truth and the obtaining justice by human testimony and agency were often found matters of difficulty or even impossibility; and the feeble and unprotected, writhing under the grasp of the wealthy and powerful, gladly availed themselves of a means which at least wore some semblance of impartiality, and possessed the reputation of conveying the infallible decision of God himself as to the guilt or innocence of the party subjected to it. The belief in this interposition once established, this form of trial would naturally become extended, on account of the apparent certainty of the result produced by it, to all varieties of cases and every class of persons. Although not originally devising it, the priesthood, perceiving in it a powerful engine of emolument and influence, soon seized upon the trial by ordeal, converted it into a completely religious ceremony, and invariably superintended its administration. The clergy may have also thought themselves as sanctioned in upholding it by the fifth chapter of the Book of Numbers, in which women suspected of adultery are commanded to submit to the ordeal of drinking the Waters of Jealousy; but the whole Biblical history of the Jews is filled with instances of direct divine interpositions which neither contemporary or succeeding nations could lay claim to. Although a passage in the 'Antigone' of Sophocles has been thought to allude to the use of the ordeal, yet there is no other reason to believe it was known to the Greeks or Romans, unless indeed the practice of augury, as manifesting divine interpositions, may be supposed to bear some remote relationship to it. It is among the various tribes who occupied Europe after the fall of the Roman empire, that we find the first

traces of this form of trial. "The earliest instance of the judgments of God among the northern nations," says M. Dinaux, "was probably furnished by the ignorant and fanatical Celt, who, when doubtful of the chastity of his wife, consigned the new-born infant, placed upon his shield, to the mercy of the waves, implicitly believing that if legitimate it would be preserved from destruction. The Salic laws introduced by the Franks admit other descriptions of ordeal, and especially that of boiling water." Gibbon, speaking of its use among the Germans and Franks, expresses himself as follows:—

"The civil and military professions, which had been separated by Constantine, were again united by the barbarians. The harsh sound of the Teutonic appellations was mollified into the Latin titles of duke, of count, or of præfect; and the same officer assumed, within his district, the command of the troops and the administration of justice. But the fierce and illiterate chieftain was seldom qualified to discharge the duties of a judge, which require all the faculties of a philosophic mind, laboriously cultivated by experience and study; and his rude ignorance was compelled to embrace some simple and visible methods of ascertaining the cause of justice. In every religion, the Deity has been invoked to confirm the truth, or to punish the falsehood, of human testimony; but this powerful instrument was misapplied and abused by the simplicity of the German legislators. The party accused might justify his innocence by producing before the tribunal a number of friendly witnesses, who solemnly declared their belief or assurance that he was not guilty. According to the weight of the charge, the legal number of these *compurgators* was multiplied: seventy-two voices were required to absolve an incendiary or an assassin; and when the chastity of a queen of France was suspected, three hundred gallant nobles swore, without any hesitation, that her infant had been born in lawful wedlock. The sin and scandal of manifest and frequent perjuries engaged the magistrates to remove these dangerous temptations, and to supply the defects of human testimony by the famous experiments of fire and water. These extraordinary trials were so capriciously contrived, that in some cases guilt, and innocence in others, could not be proved without the interposition of a miracle. Such miracles were easily provided by fraud and credulity; the most intricate causes were determined by this easy and infallible method; and the turbulent barbarians, who might have disdained the sentence of the magistrate, submissively acquiesced in the judgment of God."

This statement, that the ordeal was substituted for the trial by compurgation, in consequence of the defect and abuse of this latter, is not strictly correct; for, in point of fact, the two co-existed, and were frequently employed simultaneously. The ordeal was indeed frequently had recourse to, in consequence of the accused not being able to procure compurgators. Compurgators did not come forward as witnesses in defence of the particular accusation, but rather as witnesses of the general character of the culprit, from the tenour of which they believed him incapable of the crime charged against him. Compurgators also appeared on the part of the accuser, declaring that they did not believe him capable of preferring the change from motives of envy and hatred. A "villain" was obliged to procure the testimony of his lord as to his prior good conduct, or procure an additional number of compurgators, and submit to a treble instead of a single ordeal.

Among the Saxons we find the ordeal first mentioned in the laws of Ina, and these were afterwards modified by Athelstan, Edward the Confessor, and William the Conqueror. It was had recourse to for a great variety of offences and disputes prior to the Conquest, and even after that event, although the trial by battle was then frequently substituted for it. The modes of trial by ordeal were numerous, and, although they seem sometimes to have been almost indiscrimately employed, yet, usually, particular kinds were chosen, according to the rank of the accused and the nature of his crime.

We may cursorily notice the principal:—

1. *Fire-ordeal.*—This was usually appropriated to persons of some consideration, and was performed in different manners. In one of these an iron ball, from one to three pounds weight, after being heated in the fire, was carried in the hand for the space of nine feet; the hand was then enclosed in a bag, and sealed up. At the expiration of three days it was examined, and if found uninjured, the person was declared innocent. Another plan consisted in the accused person walking barefoot and blindfold over nine red-hot ploughshares, placed at unequal distances. Queen Emma, mother of Edward the Confessor, is said (upon very doubtful authority, however) to have passed through this ordeal triumphantly. In other instances live coals were to be carried in the garments without burning them; a heated iron glove was to be drawn on without injuring the hand; or a person was expected to pass through a burning pile unscathed. A more innocent ordeal was applied to books of doubtful tenets, when, if orthodox, their destruction by the flames was considered impossible. Eadmer tells us, that no less than fifty persons were at one time subjected to the fire-ordeal, in the reign of William Rufus, for suspected infraction of the forest laws. Theodore Lascaris, in the Eastern empire, employed the same means to detect those whom he suspected of contriving magic against him.

2. *Water-ordeal.*—This was either by boiling water or cold water. The ordeal of boiling water was especially, but not exclusively, employed for the detection of adultery. A ring or piece of metal, which had been blessed, having been thrown into a cauldron of boiling water, the accused thrust in the hand and pulled it out; according to the degree of the crime, the water was to reach as high as the wrist, or elbow, or even beyond this last. In three days the part was examined. In the ordeal by cold water, which was employed for the common people, the person was conducted from the church to the pool, and bound hand and foot. The priest then adjured the water, if he were innocent, to receive him into its bosom; but, if he were guilty, to reject him. He was then cast in, and if he floated, he was declared guilty; but if he sank, he was at once drawn out by means of a cord attached to his waist. This is the origin of the custom of floating witches, which prevailed until a comparatively recent epoch. ('Penny Magazine,' vol. x., p. 111.) The permission of the use of the water-ordeal in the church is usually attributed to Eugenius II. It was abrogated in 829, but afterwards revived, and very generally practised in the tenth, eleventh, and twelfth centuries. Grotius gives many instances of its use in Bithynia, Sardinia, &c. In this form of ordeal it was expected that a miracle would be worked to discover guilt; while in the ordeals of fire and hot water the miracle would have for its object to protect innocence.

3. *Ordeal of the Eucharist.*—This was usually confined to monks and priests. They took the sacrament with a solemn attestation of their innocence, and it was believed that a guilty person would be at once smitten with death or illness. On other occasions the person was led to the altar, and made a most solemn oath of his innocence upon the Gospels and sacred relics. By the laws of Childerbert twelve compurgators were admitted to swear with him.

4. *Ordeal of the Cross.*—This was performed differently, according as it was applied to civil or criminal procedures. In the former, the plaintiff and defendant each chose a priest as his representative. These champions remained, during the period of divine service, with their arms outstretched, so as to form the figure of a cross, and whichever priest could endure this painful posture longest, his client gained his cause. In criminal cases, two pieces of stick, upon one of which the mark of the cross was made, were hidden amidst fine wool upon the altar. One was drawn out by the priest, and if it proved the one marked with the cross, the person was declared innocent.

5. *The Corsned*, or consecrated morsel of bread or cheese, was a favourite ordeal with the priests for their self-justification, in consequence of the ease of its application. After the morsel had been placed on the altar, and the priest had implored the angel Gabriel to stop the passage of the culprit's throat if guilty, it was given to him, and if he swallowed it easily he was acquitted.

6. *Ordeal of the Bier.*—This was used in cases of murder. The murdered person was placed upon a bier, and the suspected assassin desired to approach and touch the corpse. If blood flowed from the wounds, or the position of the body became changed, the charge of murder was considered as proven. The ordeal of the bier was in frequent use in the sixteenth century, and was even resorted to on one occasion at the commencement of the eighteenth.

Many of these ordeals might be performed by deputy, and indeed there was almost a class of persons who hired themselves out for this purpose. But the deputy did no more than suffer the risk of bodily pain, and if he failed, the principal must take all other consequences upon himself.

Tietberge (A.D. 860), daughter of the emperor Lothaire, submitted, by champion, to the hot-water ordeal, and, as he escaped unhurt, all her rights were restored to her. Louis of Germany, being opposed by his uncle Charles the Bold, submitted his pretensions to the ordeal. Ten men underwent the ordeal of hot-iron, ten of hot water, and ten of cold water, and they were all successful. With the consent of the accuser, the arm of a person condemned to the hot-water ordeal might be ransomed for a certain sum of money, he then being content with the oath of compurgators. Persons taken in the act of murder or robbery were precluded the ordeal.

We have already observed that the clergy contrived to invest the ordeal with all the solemnity of a religious office. The person was delivered over to them, and kept nearly fasting for three days. Prior to the ordeal, the most solemn prayers, adjurations, and hymns were employed, in the hope of extorting the truth from the accused, and preventing him from impiously braving what in those days must have been considered a personal collision with almighty power. To this end too the sacrament was administered, and indeed every means had recourse to which could be supposed capable of exciting remorse and repentance. The trials always took place either in the church or on consecrated ground, and avowedly under the immediate superintendence of the priests. They were not permitted on fast days and festivals. This exclusive administration of the ordeal was by no means a contemptible source of revenue. The various prayers, masses, and ceremonies required each their respective remunerations, while the connivance and collusion, which must have so frequently taken place, doubtlessly did not go unrewarded.

But we must not suppose that these observances met with the unlimited approbation of the church. The canon law from an early period declared them inventions of the devil, and several pontiffs, prelates, and councils have protested against them. Agobard, archbishop of Lyons, wrote warmly against the "damnable opinion of those who pretend that God reveals his will and judgments by the proofs of fire and water." Yves of Chartres strongly deprecates them, citing a letter of Pope Stephen V. to the same effect. After one of the councils of Lateran, in 1215, the number of theological opponents rapidly increased, and the various practices soon became disused, but they seem to have lingered longer in England than elsewhere.

Many writers have hazarded conjectures as to how far these trials by ordeal were really undergone, and have attempted to explain how it happened that so many persons escaped unhurt. Although a few of these believe some kind of interposition to have been possible, yet the great bulk seem to be of opinion that deception and collusion were largely practised. Voltaire believes that the tricks of the jugglers and fire-eaters of our own day were well known then, and, from repeated practice, adroitly performed. Montesquieu thinks it possible that the rude labours and habits of our ancestors would produce so great an induration of the skin of the hands, as to render their exposure to these severe heats, for so short a period, possible, without the production of ill consequences visible at the end of three days. Dinaux reminds us how frequent the opportunities for collusion were; the accused was delivered to the priest three days prior to the trial, he remained alone with him while the heated materials were preparing, and, even during the performance of the task, the witnesses were sufficiently distant to admit of dexterous substitutions and other subterfuges. A person to whom the ordeal of fire was proposed, refused to submit to it, declaring he was neither a quack nor a sorcerer, and arrested the archbishop's persuasions, by declaring he would willingly carry the ball of hot iron, if his reverence would kindly place it in his hands. The priest declined "tempting God." Mr. Turner considers the trial by no means so formidable as it appears at first sight, for the space to carry the iron was but short, and, amid the delays of the prayers and distance of the spectators, collusion was easy. Dr. Henry thus expresses himself: "The whole was a gross imposition on the credulity of mankind. . . . What greatly strengthens the suspicion is, that we meet with no example of any champion of the church who suffered the least injury from the touch of the hot iron; but, when any one was so fool-hardy as to appeal to it, or to that of hot water, to deprive the church of any of her possessions, he never failed to burn his fingers and lose his cause." Beckmann considers that the three days prior to the trial were probably employed in the preparation of some preventive, while the masses, sprinklings, and other ceremonies during the trial, were intended to divert attention from the legerdemain then practising. He quotes a recipe given by the Dominican Albertus Magnus, in a work which he published on the ordeal in the thirteenth century, and which he says produces a paste protective of parts exposed to fire. Whether these conjectures are well founded or not, we know not, but it is certain that nearly all cotemporary evidence is unanimous in declaring the authenticity of these trials by ordeal. Few doubted their reality, but many attributed the escapes to demoniacal rather than to heavenly or wordly influences.

[To be Continued.]

Gas-Lighting.—The town of Sydney was for the first time lighted up with gas on the 25th of May last, it being the first city in Australia, or in fact in the Asiatic world, to which this important invention of modern times has been applied.